Outline

» Introduction
» Data sources
» Method for calculating the eco-indicators
» Points of attention
   » End of Life
   » Recycling
» Questions
VITO in a nutshell

VITO is a leading independent European research and consulting centre developing sustainable technologies in the area of energy, environment, materials and remote sensing.

In 2010, the total VITO budget was 90 million euro of which the contribution by contract research was 55 million euro. For 2011, VITO is counting on a budget of 95 million euro.

VITO is based at three locations in Belgium.
VITO counts > 600 highly qualified employees from diverse specialisations in 8 research units.
Subjects of the unit

- Energy Use & Supply
- Sustainability Assessments
- Sustainable Chemistry
- Closed Lean Cycles
- Land Use & Climate Change
- Living and Building
- Transport & Mobility

Transition Energy & Environment

Technology

Separation & Conversion

Energy & Environment

Sustainable Chemistry

Closed Lean Cycles

Land Use & Climate Change

Living and Building

Transport & Mobility

Energy Use & Supply

Sustainability Assessments
Introduction

» **Ecolizer**
  » Sheets with **eco-indicators** (EI)
    » Available on OVAM-website
    » Sheets for 10 topics (plastics, energy, transport,...)
    » Measure for environmental impact
    » Expressed in mPt/unit (kg, m, m², tonkm, etc)
  » Higher EI ⇒ higher environmental impact
Introduction

» Ecolizer 1.0 versus 2.0
  » Update **method** for calculation of eco-indicators
    » ReCiPe method instead of Eco-Indicator 99 method
  » Update **LCI-databases**
    » More data available
      » Materials
      » Processes
Data sources

» **LCI-database** for background data

» **Ecoinvent 2.0** database (update)
  » Extended with a.o. biomaterials
  » Ecoinvent 1.0 used for Ecolizer 1.0

» Data-record contain direct and indirect inputs and outputs

» Additional data from Pré Consultants
Introduction

» **Ecolizer**
  » **Basis** = LCA
  » **Integral** environmental impact
  » Impact categories combined in one single score
  » **Life cycle perspective**: both direct and indirect impacts
  » LCI data
Introduction

Product life cycle

Disposal/Recovery
Extraction
End-of-life
Manufacturing
Product purchase and use
Distribution
In

- raw materials
- energy

Extraction
Manufacturing
Distribution
Use
EOL treatment

Out

- emissions to water
- emissions to air
- waste
- other emissions
- co-products

Product system life cycle

Environmental impact
Method for calculation of eco-indicators

» **Ecolizer 1.0**
  » Eco-Indicator 99 method
  » Developed in 1999
  » No future updates

» Alternative method for update **Ecolizer 2.0**:
  » **ReCiPe**
    » Scientific basis
    » Successor of EI-99 method
    » Recently developed
Method for calculation of eco-indicators

» **ReCiPe**
  » Developed by Pré Consultants and CML (2009)
  » Combination of EI-99 and CML 2001 method

» **3 steps:**
  » Environmental impact categories (midpoint)
    » E.g. Climate change, acidification
  » Environmental damage categories (endpoint)
    » E.g. Damage to human health
  » One environmental indicator: eco-indicator
Method for calculation of eco-indicators

» ReCiPe – environmental impact categories (midpoint)

» Climate change
» Ozone layer depletion
» Acidification
» Eutrophication (freshwater)
» Human toxicity
» Photochemical oxidant formation
» Particulate matter formation
» Ecotoxicity (terrestrial, freshwater, marine)
» Ionizing radiation
» Land use (agricultural, urban)
» Depletion of resources (metals, fossil)
Method for calculation of eco-indicators

» ReCiPe – environmental damage categories (endpoint)
  » Damage to human health
  » Damage to ecosystems
  » Depletion of resources

<table>
<thead>
<tr>
<th>Environmental damage category</th>
<th>Weighting factor (Hierarchist/Average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human health</td>
<td>400</td>
</tr>
<tr>
<td>Ecosystems</td>
<td>400</td>
</tr>
<tr>
<td>Resources</td>
<td>200</td>
</tr>
</tbody>
</table>
Comparison EI-99 and ReCiPe

Metals (Source: Pré Consultants, LCM2009 conference)
Comparison EI-99 and ReCiPe

Transport (Source: Pré Consultants, LCM2009 conference)
Comparison EI-99 and ReCiPe

Energy (Source: Pré Consultants, LCM2009 conference)
Comparison EI-99 and ReCiPe Processes
(Source: Pré Consultants, LCM2009 conference)
Comparison EI-99 and ReCiPe

Biofuels (Source: Pré Consultants, LCM2009 conference)
Comparison EI-99 and ReCiPe

» **Difference** between eco-indicator score according to EI-99 and ReCiPe method

» Relative difference is **not always consistent**

» **Order of ranking and ratio remain** more or less the same when comparing different materials/processes
Points of attention

» **Data quality:**

  » **Black:**
  » Based on reliable data

  » **Grey:**
  » Based on limited dataset
  » Less reliable

  » **! Exclamation mark:**
  » Uncertain, based on estimations
  » generic data, not specific for the material
Points of attention

End of Life

» Per material sheet:
  » Recycling
    » Impact of recycling process
    » Credits of avoided material production
    » Total
  » Waste scenario EU
    » 80% disposal – 20% incineration
Points of attention

*EoL - incineration*

» Only combustible flows go to incineration: no indicator for incineration of ferro, non ferro and inert materials

» Own calculations

» **Emissions** and **avoided emissions** to air, **auxiliary materials** taken into account

» Type of energy recovery: **electricity**
Points of attention
Recycling

» 2 approaches:

» “end of life recycling approach”
  » Take into account the recycling scenario at end of life
    » Use indicator for recycling process
  » NO input of recycled material

» “recycled content approach”
  » Take into account the effective input of recycled material
    » Use indicator for production of recycled material
  » NO recycling at end of life
Points of attention

Recycling

EOL recycling approach (avoided burdens)

Recycled content approach
Questions?

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